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the conclusion that Nectosaurus is not a young form of Thalattosaurus as the author suspected when he wrote his memoir on the Thalattosauria.

Callibrachion.—F. von Huene has restudied[1] the original specimen of *Callibrachion gaudryi* Boule and Glan. from the figure published in *Mem. Soc. d'Hist. Nat. d'Autun,* 1893, Taf. 3, and has republished this figure as a page plate. He was led to this study by the fact that the three incongruous characters of coronoid process of the mandible, opisthocœlous cervicals and the presence of only about 20 presacral vertebræ being assigned to the form and on these characters it had been assigned to the Protorosauria by earlier authors and later to the Pelycosauria and here it is placed by Case in his "Revision of the Pelycosauria." Huene comes to the conclusion that the form is a close relative of Paleohatteria

> "Hieraus folgt, dass Callibrachion nicht zu den Pelycosaurien gehören kann, sondern sich Paleohatteria sehr nahe anschliesst und wohl als einer ihrer direkten Nachkommen aufzufassen ist."

He is then of the opinion that the earlier authors were right in assigning Callibrachion to the Protorosauria. There are 23 presacral vertebræ which are amphicœlous as in the Paleohatteria. The coronoid process is wanting in Callibrachion.

ROY L. MOODIE.

PARASITOLOGY

The Sleeping Sickness Bureau, recently established in London, has begun the publication of a bulletin. The first number (October, 1908) is devoted to a review of the "Chemotherapy of Trypanosomiasis." The treatment of trypanosomiasis in man, the biological accommodation of trypanosomes to chemotherapeutic agents and the treatment of experimental animals are considered in succession. A bibliography of some 200 titles concludes the number. Future issues of the bulletin will include all the current literature of trypanosomiasis.

The following items excerpted from the summary of this mass of experimental material are of primary biologic interest. The use of any trypanocide by itself can not be justified. Combined therapy has the advantage that each drug can be used in smaller doses. The alternation of trypanocidal agents avoids the habituation of the parasites to a single remedy which has been thoroughly demonstrated through laboratory experiments. A second paper deals with the medical results of segregation camps and of chemical therapy in Uganda.

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[1] *Centralblatt für Mineral. Geol. Paleontologie,* 1908, No. 17.

In the Huxley lecture, delivered at Charing Cross Hospital, October 1, 1908, Sir Patrick Manson, speaking on "Recent Advances in Science and their Bearing on Medicine and Surgery," discussed some points of great interest to biologists. At the start he noted the propriety of this theme for a Huxley lecture since the successful study of tropical diseases both depends on the use of those methods so consistently and powerfully employed by that great master of natural science, and also deals primarily with animal organisms, protozoa and helminthes, as disease producers and their special vectors, commonly arthropods, while bacteriology is relegated to a secondary place. In the study or teaching of tropical medicine this fact must be recognized by the addition to each staff of a protozoologist, a helminthologist, and an arthropodologist with suitable library and laboratory facilities. After presenting a synoptic table which outlines the principal tropical diseases with their causal and intermediary agents, the lecturer proceeds to discuss the appropriateness and value of biological theories in scientific advance with special reference to this field. Certain blood-inhabiting protozoa require a second host as a medium for a sexual cycle, as for instance the malarial plasmodium makes use of the mosquito. Is this to be regarded as a general law applicable to all such protozoa? The answer to this question is of fundamental importance in practical medicine as well as of intense interest to the biologist. The case of the sleeping sickness trypanosome will serve as an example for testing the problem.

The chief argument in favor of such a law is to be found in analogy, and though it must be used with caution the evidence in this case is distinctly favorable. All animals appear to require periodic sexual changes, and in other protozoa a sexual cycle necessarily interrupts the periods of asexual reproduction if the existence of the species is to be prolonged beyond narrow limits. In many cases where the existence of such a sexual cycle had long been denied it has been demonstrated by more intensive study. So highly developed a form as the trypanosome can hardly be an exception to this rule. By analogy such a stage would be found outside the human body and probably in the appropriate carrier of the disease, the tsetse fly.

On the other hand, four arguments have been brought forward against the acceptance of such a law: (1) No such sexual phase has yet been demonstrated in any trypanosome. The history of science gives scant weight to such negative evidence, especially when one considers the minuteness of the organism and the refractory character of the object studied, the tsetse fly. (2) The sexual phase of the trypanosome may be passed in the vertebrate blood and thus the tsetse fly be a mere mechanical carrier. There is, however, no evidence favorable to this view, either in observation or by analogy. (3) The successful inoculation of the trypanosomes through a long series of vertebrate hosts has been held to indicate that a sexual cycle is unnecessary. Yet similar laboratory transfer has been practised with the malarial plasmodium, for instance, though such a sexual cycle in the mosquito is demonstrated beyond all question. (4) An insect intermediary is apparently unnecessary in one trypanosome, that which causes dourine or mal du coit in horses, and therefore is not a biological necessity in any other species of trypanosome. This Sir Patrick Manson regards as the most formidable argument yet advanced against the law under discussion, but does not consider it as final. He devotes much space to the consideration of details in the case and the presentation of an alternative hypothesis which is too involved to reproduce in abstract. While the discussion presents many points of interest, yet the entire absence of experimental evidence in its support leaves this view as at present a bare working hypothesis. It may be added further that even the total rejection of this hypothesis does not necessitate the adaption of the view it combats. Much further investigation is needed before one can say with any confidence how the evidently exceptional case of the dourine trypanosome is to be explained. He concludes:

> "I hold, therefore, that the existence of a sexual phase in the sleeping-sickness trypanosome, *T. gambiense,* and other trypanosomes, is more than probable, and that it has not been disproved; that the argument founded on the natural direct communicability of dourine in the apparent absence of an insect intermediary for its germ, *T. equiperdum,* is not valid; and that the evidence hitherto adduced is distinctly in favor of a law to the effect that blood-haunting protozoa having arthropod vectors require, and make use of, these vectors for necessary sexual development. Why the sexual stage of these parasites is passed in the arthropod, and not in the vertebrate, I cannot explain,

any more than I can explain the contrary arrangement which obtains in the blood-haunting nematodes, the sexual stage in their case being passed in the vertebrate host, the asexual in the insect.

"I have no doubt, while listening to these remarks, it has occurred to some of you, as it has often occurred to me, that the principles I have endeavored to express have a wider application than that which I have directly indicated, that our disease germs and our ectozoa—insignificant though the latter appear to be—are correlated more frequently than is generally suspected; that, in fact, there is a necessary relationship between them." HENRY B. WARD.

EXPLORATION

Camp-fires on Desert and Lava.[1]—Lovers of outdoor life in the far distant west will be delighted on opening W. T. Hornaday's recent work, "Camp-fires on Desert and Lava," to observe, on the back of the half title page, a figure of the omnipresent Eleodes in very characteristic attitude. This little black creature by his position seems to be pointing us heavenward, but far from it. He is ever ready to present us with a drop of sticky brown fluid which has a horrible odor and whose stain will withstand the strongest soaps. The beetle forms a fitting introduction to the delightful account which follows.

The author needs no introduction to the reading public nor to the zoologist. To the one he is already well known by his previous volumes and to the other by his connection with the National Museum and with the New York Zoological Park as well as by his scientific writings, not the least important of which is his "Extermination of the American Bison," published in 1889. Mr. Hornaday is an enthusiastic collector and observer. All those who follow him into the Pinacate region, described in the present work, will never regret it.

On our present maps the region visited by Mr. Hornaday and his friends is variously located; suffice it to say that it is in the northwestern part of Mexico and not many miles from the Gulf of California. The region was attractive for several reasons, among which was the one that it had never been explored by any scientist or if it had there was no record of it. Other reasons which attracted the party to the region were the possible presence of big game and for Dr. MacDougal, who originated the plan, there were untold new plants, of a type very interesting to him, to be discovered. Dr. D. T. MacDougal made

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[1] William T. Hornaday, Camp-fires on Desert and Lava. Illustrated. Charles Scribner's Sons, New York, 1908.